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Space management: a study on space usage level in higher education institutions

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Abstract

According to Archibus (1987), space management is to effectively manage the space to reduce the cost of wasted space and optimize the use of space. Nowadays, research on space management plays an important role to ensure the related organization will achieve the target of its business goal. The optimization of space management contributes to the efficiency and success of most organizations. The importance of the costs to build and acquire, to maintain and use should not be taken frivolous. In fact, the expenses associated with the space are the second highest cost after staff salary in higher education institutions. Subsequently, a study on space management especially in higher educational institutions is highly critical more than other organizations. The purpose of this paper is to identify the level of space usage in UTHM as a case study**.** The study specifically took place at the actual lecture room usage against the students' time table which was made available by the Academic Management Office of the university (audit). Interview of space user (person in charge) that represents UTHM in higher education institutions has been conducted to find out the level of space usage. The result is differentiation of audit and qualitative use to analyze the level of space usage. The aim is to see if the user use the space efficiently compared to the audit method. To overcome the problem, the space charging model will be suggested as a management tool for the space management. The Space Charging technique will foster attentiveness of the costs of space and eradicate a culture which sees space as free good. Noted that the space management for institute of higher education are very critical and therefore, space and facilities management have to be the main agenda and need to be managed efficiently and appreciated wisely.

Keywords: Space management, space wastage, effectiveness, higher education institutions.

1.0 Introduction

Space management is one component of facilities management. Facilities Management is a profession that encompasses various disciplines to ensure a working environment to function properly through the integration of human resources, workplace, process and technology (IFMA, 2005). Nowadays, space management will be one of the most important components in the facilities management

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. This is due to the fact that this valuable asset can generate the income if managed effectively by any organization (Ahmad Fauzi, 2005). The cost implications of physical resources in large organizations such as in higher education institutions are very high. Efficient and effective space use can reduce the costs and productivity levels (NAO, 1996). In fact, the study in the space management for institutions of higher education is more critical than other organizations (NAO, 1996). Kenny and Foster (1985), stated that the cost which related to the physical sources is the second most important budget after staff salary in higher educational institutions. Marsh and Griffith (1985) stated that the cost of academic space for a student is about USD 2,000.00 per year. This information shows that the cost is equivalent to the cost of space per employee in the corporate organization (Hamer.J.M, 1988).). However, space wastage happens in all higher educational institutions including University Tun Hussein Onn Malaysia (UTHM). On average, monthly electricity cost for UTHM is RM700,000.00 or RM8.5 million a year and an average use of operating and maintenance costs of buildings for the year 2009 is RM25 million. According to a case study in Universiti Teknologi Malaysia (UTM) Skudai, building's operational cost accounted for a staggering amount of RM56 million a year for whole UTM. Since energy costs are 15% of the total operating budget in the building (Williams.B, 1994). It means by RM8.4 million was contributed to the cost of energy. Other costs include operating costs of other building but energy cost is relatively cheaper in this country if compared to other country, and possibly energy cost is less than 15% of the total cost of building operations. If this assumption is considered, the overall cost of building operations will be more than RM60 million a year. However, all associated costs can be controlled by efficient space management.

2.0 Related Works

2.1 Space Management Concept

According Best.R (2003), space management is a service delivery and how to manage space effectively. Space management includes alternative officing, free addressing, group addressing, virtual office, space sharing and on and off premises management. There are three important things that need to be emphasized by management. The first one is to develop a management committee members, second is a model or technique of managing the space and the third one is to ensure that employees know and understand the management of space by producing clear guidelines on how the space management is operated (NAO, 1996). The three factors above are important in effective and efficient space management .There are several techniques outlined by the NAO in the space management through scheduling, space charge (space charging) and space planning based on room usage priority. The figure below shows four aspects in facilities such as process, technology, people and premises. This study is referring to only one aspect in the premises. This is because space management is located under premises.

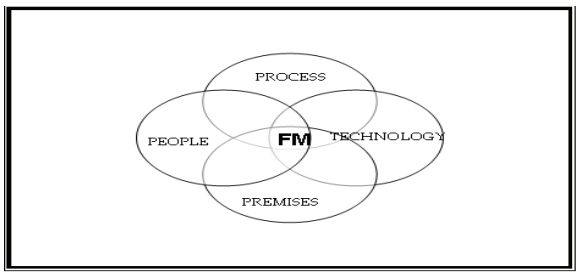

Figure 1. Theoretical Framework
Source: Rondeau et al. (2006)

2.2 An Effective of Space Management in Higher Education Institutions

In a large organization like the higher education institutions, space management plays an important role to manage space effectively without wasting space in which they indirectly impact adversely the cost. Space management is important for the university either in the office hour or not and this awareness has arisen since the 1960's (Ahmad Fauzi, 2005). As stated in Lawrence (1989) and Williams (1994) statements, space is the catalyst for the cost of other operation. The more space used means more energy costs, cleaning and repairs required. Use of space if not managed systematically can result in the occurrence of wasted of space. Higher education financing today is borne by governments or specific agencies in the organization, they are late and slow in accepting change and corporate culture. Thus, the optimization of resources received and practiced slowly. Although the higher education institutions say have a lack of space learning but Wamer and Leonard (1992) explained that most higher education institutions is not optimizing the use of large physical resources at particular times, such as lower consumption in the tutoring sessions, was not used in the evenings, nights, holidays and vacation semester.

Physical resources in an institution that is actually used by outside bodies at that time by chartered for the research purpose, teaching and social interaction to outside bodies and the surrounding society. In the Space Management Project (Space Management Project, 2006) there are several constraints in effective space management. The constraints such as target-specific or objective difficult to measure, the lack of data such as room capacity, functionality, user space, and other uses, the most extensive survey Utilization focused on learning space only, each institution using the norm and different indicators, and relationship between guidelines and management area is separate and the user is not involved in space management policy (Space Management Project, 2006). However, this constraint can be managed with systematic and efficient space management.

3.0 Research Methodology

This paper is to identify the level of usage of space in teaching and learning at UTHM asa a case study. To achieve this objective, researchers will use two methods Firstly, the lecture room and hall audit usage compare to the time table provided by the Academic Management Office and then compare with the real usage of the lecture room. The second method is an interview with the person in charge. 10 people were selected comprising the head of center in charge such as Faculty of Technology Management, Business and Entrepreneurship, Faculty of Electrical and Electronic Engineering, Faculty of Technical Education , Faculty of Public and Environmental Engineering, Faculty of Mechanical and Manufacturing Engineering, Faculties of Arts, Science and Heritage, Faculty of Computer Science and Information Technology, Academic Management Office, Property Management Office, and the Registrar's Office.

Merriem (1998) state that there are three types of interviews which are structured interviews, semi-structured interviews and unstructured interviews. A semi-structured interview was implemented in this study because it is flexible and can describe what the respondent thinks. The first method (audit) will be compared with the qualitative method. The aim for this study is to see the difference findings of audit method between the respondents view. For audit method, Block G at UTHM was selected as the study case area because lot of lectures being conducted in this particular building and this building can accommodate about 3180 students. Six factors were measured for the level of space wastage which is occupancy, utilization, frequency used, frequency booked, used but not booked and booked but not used. This study took a week of classroom use starting from Monday to Friday at 8 am to 6 pm. Formula and measuring on the level of wastage is shown below.

Table 1. Usage Indicator
(Source: Adapted from Salford University)

No	Item	Formula
1.	Frequency Booked	$\frac{\text{Hours booked}}{\text{Available Hours Book}} \times 100\%$
2.	Frequency Used	$\frac{\text{Hours used}}{\text{Hours Available}} \times 100\%$
3.	Occupancy	$\frac{\sum \text{Total Students}}{\text{Capacity Room} \times \text{Hours Usage}} \times 100\%$
4.	Utilization	$\frac{\text{Room Used Frequency} \times \text{Room Occupancy}}{100}$
5.	Used but not Booked	$\frac{\text{Hours Used Not Booked}}{\text{Available Hours Booked}} \times 100\%$
6.	Booked but not Used	$\frac{\text{Hours Book not Used}}{\text{Book Hours}} \times 100\%$

Table 2. Effectiveness Level
(Source: Salford University)

Usage	Effectiveness Level (%)
Frequency Booked	» 75
Frequency Used	» 75
Occupancy	» 75
Utilization	» 56

4.0 Analysis

Based on the table 3 below, all of the classrooms at the G3 block show up to75 percent of usage percentage and it mean the management of academic officer makes a full and maximum booking and no space wastage is considered in the frequency booked. Lecture hall that has the highest frequency booked is Lecture Room E1 120.93 per cent. While the lecture room of the lowest frequency booked is Lecture Room E3, 72.09 per cent. Analysis of the frequency used show all of the classrooms were in optimum use. This means no space had been wasted for the frequency use factors. Lecture hall with the highest frequency use is Lecture Room E1 of 120.93 per cent while the lowest frequency use is the Lecture Room E8 of 76.74 percent. For occupancy analysis, all of the lecture rooms in the G3 block were not in optimum level because it was below 75 per cent. Lecture hall with the highest percentage in occupancy factor is Lecture Hall D of 63.84 per cent while the lecture hall with the lowest percentage is Lecture Room E8 with 29.13 per cent. There are 14 lecture halls that were in optimal for the optimization factor, while 12 lecture room which is not optimal. Lecture room with the highest utilization is lecture hall E5, 67.33 per cent. Lecture Room E3 is the lowest utilization of 27.03 per cent. There are 16 classrooms that use the classrooms but not booked. Discussion Room 2, Lecture Room B3, B10 and Discussion Room E2 recorded the highest level of 12%. The results of analysis booked but not used shows that there is only one lecture room using the classrooms as the Academic Management office schedules which is E6. There are 25 classrooms that booked but not use. The highest classrooms for this factor are Lecture Room E9, 42 percent. While the lowest percentage is the lecture rooms B7 consisting of 2 per cent. Qualitative analysis showed that about 70 percent of respondent said space is in optimal use and, 30 per cent said space is not in optimal use. Reasons and examples provided by the respondents is the maintenance and building construction is not in specification. For example, the training rooms in the university registrar's offices are not equipped with sound proof equipment. Similarly, the high roof can be a waste of electricity. Besides that, the study showed 60 percent of respondents said that the classrooms are not enough and 40 percent said the classrooms is enough. Studies also show that 60 percent are not satisfied with the mechanisms currently in use, while 20 percent is satisfied and 20 per cent not sure with the mechanism used in UTHM currently.

Mechanism used to solve the space problem in UTHM is a scheduling method which all of the classrooms compiled in a timetable based on time appointed by the Academic Management Office. The result of quantitative method shown in figure 2, figure 3 and figure 4.

Table 3. Space Usage Level

No.	Classroom	Frequency Used (%)	Frequency Booked (%)	Occupancy (%)	Utilisation (%)	Used But Not Booked (%)	Booked But Not Used (%)
1	Lecture Room B1	113.95	113.95	51.58	58.78	0	21
2	Lecture Room B2	95.35	86.05	57.71	55.03	9	11
3	Lecture Room B3	116.28	104.65	53.10	61.74	12	14
4	Lecture Room B4	113.95	111.63	48.11	54.83	2	19
5	Lecture Room B5	95.35	90.70	54.33	51.80	5	16
6	Lecture Room B6	93.02	88.37	56.66	52.70	5	14
7	Lecture Room B7	102.33	97.67	63.58	65.06	5	2
8	Lecture Room B8	100	100	53.46	53.46	0	14
9	Lecture Room B9	90.70	90.70	44.68	40.52	0	28
10	Lecture Room B10	100	88.37	37.27	37.27	12	12
11	Discussion Room 1	102.33	97.67	40.26	41.19	5	5
12	Discussion Room 2	106.98	95.35	57.64	61.66	12	21
13	Lecture Room E1	120.93	120.93	53.29	64.45	0	16
14	Lecture Room E2	88.37	88.37	38.55	34.07	0	14
15	Lecture Room E3	81.40	72.09	33.29	27.09	9	19
16	Lecture Room E4	100	90.70	35.81	35.81	9	37
17	Lecture Room E5	113.95	109.30	59.08	67.33	5	12
18	Lecture Room E6	109.30	109.30	59.44	64.97	0	0
19	Lecture Room E7	90.70	90.70	51.10	51.1	0	9
20	Lecture Room E8	76.74	76.74	29.13	29.13	0	23
21	Lecture Room E9	100	100	34.51	34.51	0	42
22	Lecture Room E10	102.33	97.67	42.33	43.31	5	21
23	Lecture Hall C	106.98	102.33	33.69	36.04	5	5
24	Lecture Hall D	100	97.67	63.84	63.84	2	2
25	Lecture Hall F	93.02	90.70	41.14	38.27	2	12
26	Lecture Hall G	100	100	40.96	40.96	0	14

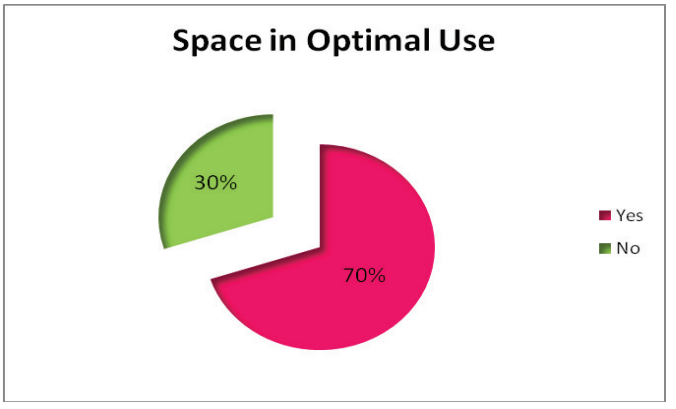

Figure 2. Space in Optimal Use

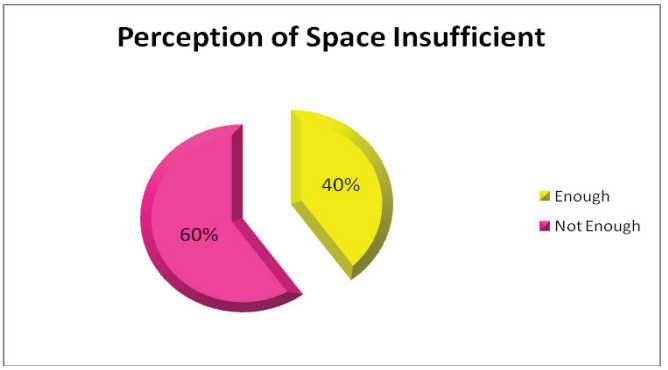

Figure 3. Perception of Space Insufficient

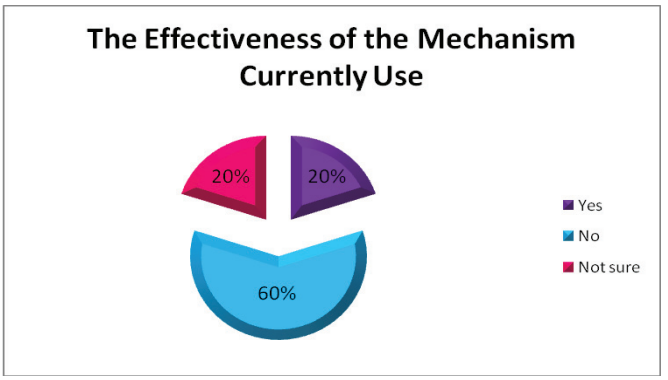

Figure 4. The Effectiveness of the Mechanism Currently Use

5.0 Discussion

Results analysis showed a significant difference in the outcome of the methods. Qualitative results indicate that the use of the classrooms is efficient and optimal, while the audit results showed the otherwise. The respondents feedback, lack of space is a problem and the main issues in the use of space. The main reason because of insufficient the space is more concentrated on the study of undergraduate students only. Besides that, insufficient space is due to scheduling overlap. Respondents also said, that the rooms was comfortable enough but useless because of the size of classrooms are not suitable and overcrowded for the lecturing. These circumstances, in contrast to the results of the audit showed that the use of all classes is not optimal. The majority of respondents said the classrooms is not enough, but based on the audit, a lot of empty space left unused. Based on the auditing also showed that, a total of 25 classrooms is booked but not used. This situations were cause of the used of water, air-conditioner ,electrical and other utilities cost. The respondents agreed that the Academic Management Office and Property Management Office are responsibility for space management in UTHM. However, all parties should have responsibilities on space including students and lecturers. Space wastage can be avoided with the awareness of the user. Nevertheless, respondents also react on the space problem in the university and what methods are used to solve this problem. From the feedback showed that most of the new university in this country is experiencing the space problem compared to the old once. The new university had to rent the space for example a retail shop as the space for lecturing activities because the inadequacy of space in the university. By the most universities experience the same to solve the space problem and using the scheduling methods. Results analysis also indicated that 60 per cent of respondents disagreed with the existing methods and suggested should be improved or using the new methods.

6.0 Conclusion

Finally, based on this study, it can be concluded that the result of the audit method shows totally different opinions and views of space user. Audit results show all of the classrooms use is not optimal, while the respondents say the use of space is optimum, but space is not enough. They noted the challenges and obstacles for the optimum use of space due too many parties involve to manage this space either the property management office and registry management office and there is no center that specializes in managing the space. The findings showed that, no proper standards for classrooms in the campus university level and the overlapping schedules of lecturing within exchange the student sessions. This will cause the class left empty because of the use capacity is not compatible for a numbers of students. Other problems was determined is the lecturer changes the timetable without prior notice to the academic management office. Thus, non-optimal usage of space can contribute to the waste of space. To overcome this problem, the Space Charging Model is proposed as a tool for optimal space management. According to Griffit.G and David.H (1999), Space Charging Model is a method in which the costs will be imposed on the space in a building that is not fully utilized. Some institutions believe that effective methods of Space Charging can minimize the demand for the use of space and can be used in the best way without a valid waste. Weatherhead pointed out that Space Charging can also be used as a basis to determine the internal rent space to ensure that the users can understand the overall cost of operations and facilities. He suggested that all parts of the occupied space should be charged (Weatherhead. M, 1997). There are four elements in Space Charging concept which is space to be charged, amount to be charged, mechanism for cost and the source of payment for the charge (NAO, 1996). This method is supported by NAO and has been certified as the best method in 1996. Many facilities experts said that this method is the best management tool (NAO, 1996). Hopefully, this study can provide awareness to users about the importance of optimum use of space and not see space as a free good. Indirectly, they have come to appreciate the space that they possessed.

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